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October 23, 2003

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APPLICATION NUMBER: *60/435,626*
FILING DATE: *December 19, 2002*
RELATED PCT APPLICATION NUMBER: *PCT/US03/25421*

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

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12-27-02 [illegible] APROV

PTO/SB/16 (10-01)
Approved for use through 10/31/2002. OMB 0651-0037
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

Express Mail Label No. EV151113534US

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Pierre	Bonnat	Grieges, France,
Adam M.	Howard	Las Vegas, Nevada

☐ *Additional Inventors are being named on the ___ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (280 characters max)

Method And Apparatus To Interact With A Machine Utilizing Gestures

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

☒ Customer Number [ ] → *08791*

OR *Type Customer Number here*

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☒ Specification *Number of Pages* 12 ☐ CD(s), Number

☒ Drawing(s) *Number of Sheets* 2 ☒ Other (specify) Postcard

☐ Application Data Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT *(check one)*

☐ Applicant claims small entity status. See 37 CFR 1.27.
☒ A check or money order is enclosed to cover the filing fees
☐ The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 02-2666
☐ Payment by credit card. Form PTO-2038 is attached.

FILING FEE AMOUNT ($): $160.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No
☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,
SIGNATURE Sanjeet Dutta   Date 12/19/2002
TYPED or PRINTED NAME Sanjeet K. Dutta   REGISTRATION NO. *(if appropriate)* 46,145
TELEPHONE (408) 947-8200   Docket Number: 5769P007Z

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

PTO/SB/17 (10-02)
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FEE TRANSMITTAL for FY 2003

Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27.

TOTAL AMOUNT OF PAYMENT ($) 160.00

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Pierre Bonnat
Examiner Name	
Group/Art Unit	
Attorney Docket No.	5769P007Z

METHOD OF PAYMENT (check one)

☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☐ Deposit Account

Deposit Account Number: 02-2666

Deposit Account Name: Blakely, Sokoloff, Taylor & Zafman LLP

The Commissioner is authorized to: *(check all that apply)*

☐ Charge fee(s) indicated below ☐ Credit any overpayments

☒ Charge any additional fee(s) required under 37 CFR §§ 1.16, 1.17, 1.18 and 1.20.

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	740	2001	370	Utility filing fee	
1002	330	2002	165	Design filing fee	
1003	510	2003	255	Plant filing fee	
1004	740	2004	370	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	160.00

SUBTOTAL (1) ($) 160.00

2. EXTRA CLAIM FEES

	Extra Claims		Fee from below		Fee Paid
Total Claims		- 20* =		x =	
Independent Claims		- 3* =		x =	
Multiple Dependent				=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	84	2201	42	Independent claims in excess of 3
1203	280	2203	140	Multiple Dependent claim, if not paid
1204	84	2204	42	**Reissue independent claims over original patent
1205	18	2205	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

**or number previously paid, if greater, For Reissues, see below*

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
2053	130	2053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	400	2252	200	Extension for reply within second month	
1253	920	2253	460	Extension for reply within third month	
1254	1,440	2254	720	Extension for reply within fourth month	
1255	1,960	2255	980	Extension for reply within fifth month	
1404	320	2401	160	Notice of Appeal	
1402	320	2402	160	Filing a brief in support of an appeal	
1403	280	2403	140	Request for oral hearing	
1451	1,510	2451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,280	2453	640	Petition to revive - unintentional	
1501	1,280	2501	640	Utility issue fee (or reissue)	
1502	460	2502	230	Design issue fee	
1503	620	2503	310	Plant issue fee	
1460	130	2460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	740	1809	370	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	740	2810	370	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	740	2801	370	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($)

SUBMITTED BY

Complete (if applicable)

Name (Print/Type)	Sanjeet K. Dutta	Registration No. (Attorney/Agent)	46,145	Telephone	(408) 947-8200
Signature	Sanjeet Dutta			Date	12/19/02

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UNITED STATES PROVISIONAL PATENT APPLICATION

FOR

METHOD AND APPARATUS TO INTERACT WITH A MACHINE UTILIZING GESTURES

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"Express Mail" mailing label number: EV151113534US
Date of Deposit: December 19, 2002
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Geneva Walls
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(Signature of person mailing paper or fee)

December 19, 2002
(Date signed)

METHOD AND APPARATUS TO INTERACT WITH A MACHINE UTILIZING GESTURES

The present application incorporates by reference the disclosures in the following co-pending applications:

1. U.S. patent application serial no. 09/913,398, entitled "METHOD AND DEVICE FOR MONITORING AN ELECTRONIC OR COMPUTER SYSTEM BY MEANS OF A FLUID FLOW", filed August 10, 2001.

2. U.S. provisional application serial no. 60/368,602, entitled "A METHOD AND APPARATUS FOR POINTING AND CLICKING FUNCTIONS FOR CURSOR TRACKING IN GUI ENVIRONMENT", filed March 29, 2002.

3. U.S. provisional application serial no. 60/378,561, entitled "METHOD AND DEVICE FOR PROVIDING INPUT INTERFACE FOR THE AVIONICS AND AEROSPACE APPLICATON", filed May 6, 2002.

4. U.S. provisional application serial no. 60/378,573, entitled "METHOD AND APPARATUS FOR MONITORING AN ELECTRONIC OR COMPUTER SYSTEM BY MEANS OF A FLUID FLOW UTILIZING OPTO-ELECTRONIC CONVERSION DEVICES", filed May 6, 2002.

5. U.S. provisional application serial no. 60/402,994, entitled "METHOD AND APPARATUS FOR IMPLEMENTING USER INTERFACE CONTROL, AND NATURAL LIGHT SOURCE USAGE FOR SUCH CONTROL", filed August 12, 2002.

6. U.S. provisional application serial no 60/417,539, entitled "METHOD AND APPARATUS TO INTERACT WITH A MACHINE UTILIZING A FLUID," filed October 9, 2002.

DETAILED DESCRIPTION

A method and apparatus to interact with a machine utilizing gestures are described. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be evident, however, to one skilled in the art that the present invention may be practiced without these specific details.

The present application describes an exemplary embodiment for input interfaces.

This exemplary embodiment may be deployed in advanced mobile telephony, mobile computing, assistive inputting environments. It proposes that a user is enabled to run all the functionalities typically found on a mouse (or other UI navigation system) by various user interaction including breathing (e.g., air flow) and gestures utilizing ambient light with no need for complex commands or to "change the tool", such as, on a mouse, moving a finger from the button to the wheel in order to get a satisfactory scrolling, for example through web pages or long documents. Continuity and ease of interaction may thus be improved.

In an exemplary embodiment, transitions between motion and scrolling, or differentiation between pointing and clicking may be smooth, progressive, in the same breath, or in a continuous gesture.

According to an exemplary embodiment, an interface device is optimized by utilizing ambient light.

AMBIENT LIGHT

A substantial energy saving is achieved by reducing the powering of artificial sources of light such as LEDs or lasers by using ambient daylight to complement or replace artificial sources.

The present embodiment applies to any kind of ambient light, including any sort of fluorescent and/or incandescent lights, thanks to suited light detectors and specific windows opened in the casing of the device, close to detectors (3.a & b.). Thus, the present embodiment allows to avoid or at least reduce the piping of ambient light to detectors.

The present embodiment allows the four light detectors (clockwise: left, down, up, right motion) to be illuminated at their rest position, the stress breath coming to decrease the amount of light to be received by the detector, possibly up to darkness.

An artificial source of light is embedded in the device (preferably LED), so to complement the ambient light for usage by night or in insufficient light, thanks to an averaging of the amount of light detected (cycling of detectors), to be processed by microcontroller. This artificial light can be piped (fiber optics...) or reflected to the detectors (3. a.).

Detectors are angled (3. c.), in order to get the best ambient illumination in either ways of interfacing (air or gesture, see below), regardless of the position of the device, supposedly close to the user's chin or put on a surface.

INTERFACING USING GESTURES

The use of ambient light makes it possible, with a single device, to interface either by means of air flow (i.e., the user breathing) or gesture.

Indeed, the user can run all the functionalities of a mouse by breathing. In line with this, and notably given the current enhanced recourse to ambient light, the user can input computers (GUI) and electronic appliances by means of gesture as well. For example, the device, generally part of a headset, head-mounted device, or any other wearable apparatus enabling the user to breathe into it, can be put down on a desk or any surface (possibly after being removed from its usual support, see 3. g. & 4., example of a headset), worn on a belt, or inserted in existing workstations, so to be used as a gesture-based input interface (5.). This should be noted that the device is preferably wireless (eg., Bluetooth).

That way, movements of the hand will interfere (shade, see 3. f.) with the ambient illumination of the device (with no contact with the device itself), and consequently with the illumination of the embedded detectors, so to generate an analog sensing, to be processed as pointing functionalities (eg., the shade of the hand – or even a single finger – positioned directly above a detector, disrupts, possibly up to full darkness as the hand

gets closer to the device, the illumination of the "left" detector, thus generating a motion of a cursor towards the left, on a monitor... all combinations being possible so to get diagonals, while acceleration is provided through processing scalability of the electric signals that result from the sensing), whereas Boolean functions such as clicking will preferably result from fast movements (brief breaks in detectors' illumination, eg., all detectors' illumination disrupted within a short period of time is processed as a single click, left button of a mouse if the disruption starts on the left – left-hand detector -, all detectors' illumination disrupted within a short period of time, first from left to right, then the opposite is processed as a double click, left button, while all detectors' illumination disrupted within a short period of time is processed as a single click, right button of a mouse if the disruption starts on the right... A "double-click", "right button" could thus be processed as a held click, etc.). The latter are just processing options, insofar as the sensing on its own allows to work out a variety of functionalities on the processing side, according to usage patterns.

In an alternate embodiment, buttons on the device can handle the clicking functionalities by pressing them. However, such design would provide a minimal-contact type of interaction, allowing a high level of protection in extreme environments (industrial workstations, for example, in which the device could be put down under an airtight, waterproof "bell jar"). Nevertheless, a button can be added on the casing of the device to switch between air and gesture-based interaction.

Different design options come to enhance the user experience, such as, on the ergonomics side, position the "up-sensor" window towards the top of the device (3. e. & d.), allowing an easier and more effective gesture recognition, or the way detectors are angled to optimize their illumination by the ambient light.

SEGMENTS DESIGN

The present embodiment uses four segments in place of eight. These non-transparent (non conductive to light, full bandwidth) segments can be stressed in two directions, either by the user blowing out (expiring) or sucking in (inspiring), enabling a reduction of their number. The segments are, assembled together in the form of a flexible comb, possibly holding springs or other mechanical systems able to stabilize the segments' rest position (2. d.). Their free end travel is quite restricted (2. a.).

Channels are specifically designed to channel the air flow from inlet/ outlets opened on the top of the device up to those of the bottom by optimizing the stress breath on segments, however allowing a logical visual positioning of the top outlets (sections 1. a to 1. d.) and a manufacturing/ assembly process. The segments are positioned in relatively (no friction between segments and walls) airtight compartments (2. c.) that make the vacuum/ "sucking in" stress easier by minimizing the volume of air, and that make the stress breath/ "blowing out" action more variable, notably insofar as 100% of the air expired comes to stress the segment until it reaches a position that allows the air to escape by the inlet/ outlet opened on the bottom of the compartment and device.

The segments allow, at their rest position, the detectors to be illuminated by ambient light and possibly, when needed, by complementary (preferably piped) artificial sources (2.b.). The stress breath comes to make the segments move so that they will:

- user blowing out: progressively reduce the amount of light able to hit the detectors. This results in an analog sensing is able to generate pointing functionalities such as movement (cursor, pointer...), scrolling, zooming, according to processing.
- user sucking in: allow switch-type contacts, thanks to (at least part of) their surface being conductive and brushes, wires, or pins. A variety of designs can be implemented so to allow different sort of switches. This results in a digital sensing able to generate clicking functionalities and similar interactions (selection...). This combination of expiration and inspiration, within a short, fast sequence, can be used to generate "Boolean" functionalities such as (double) clicking.

The above described processing pattern is an exemplary embodiment, which can translate into various programs, including different modes of cycling, checking (IRQ...), pulsing the light sources and detectors, several thresholds, ranges, signal levels and incrementation, conditions, in order to comply with existing computing environments (e.g., ports, interfaces, drivers, GUI functionalities, applications) or new ones as well, such as "3D" (three dimensional) applications.

Lastly, it should be noted that the exemplary processing pattern can apply to a variety of sensors, in addition to those previously described, in order to enable a Human-Computer (or Human-to-electronic-appliance) interaction, more precisely an inputting.

The figures below also show a diagrammatic representation of machine in the exemplary form of a computer system within which a set of instructions, for causing a machine to perform any one or more of the methodologies discussed above may be executed. In alternative embodiments, the machine operates as a standalone device or may be connected (e.g., networked) to other machines. In a networked deployment, the machine may operate in the capacity of a server or a client machine in server-client network environment, or as a peer machine in a peer-to-peer (or distributed) network environment. The machine may be a personal computer (PC), a tablet PC, a set-top box (STB), a Personal Digital Assistant (PDA), a cellular telephone, a web appliance, a network router, switch or bridge, a user interface device capable of interacting with any of the above described devices, or any machine capable of executing a set of instructions (sequential or otherwise) that specify actions to be taken by that machine. Further, while only a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute a set (or multiple sets) of instructions to perform any one or more of the methodologies discussed herein.

The exemplary computer system includes a processor (e.g., a central processing unit (CPU) a graphics processing unit (GPU) or both), a main memory and a static memory, which communicate with each other via a bus. The computer system may further include a video display unit (e.g., a liquid crystal display (LCD) or a cathode ray tube (CRT)). The computer system also includes an alphanumeric input device 1912 (e.g., a keyboard), a user interface navigation device (e.g., the user interface device discussed above), a disk drive unit, a signal generation device (e.g., a speaker) and a

network interface device.

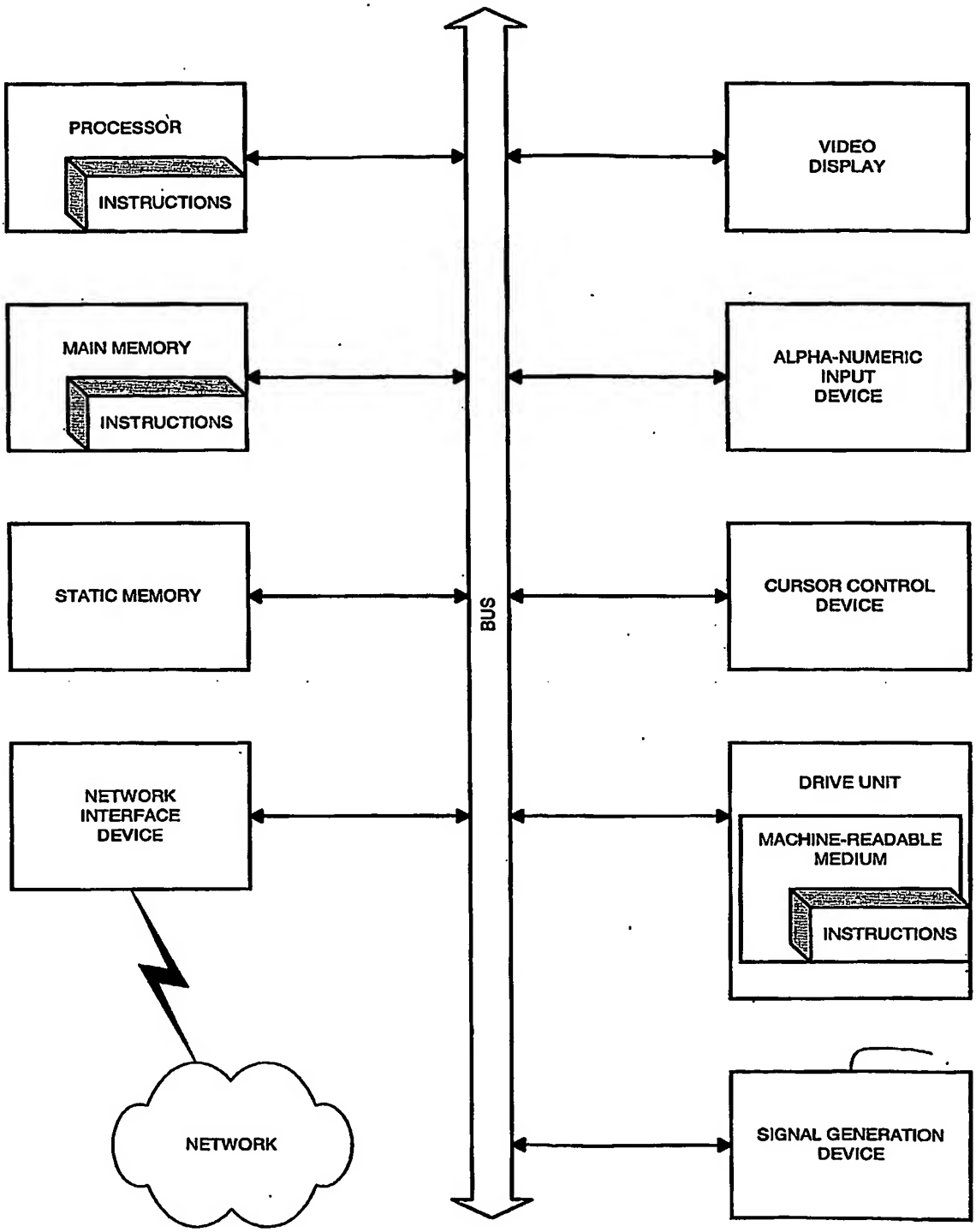
The disk drive unit includes a machine-readable medium on which is stored one or more sets of instructions (e.g., software) embodying any one or more of the methodologies or functions described herein. The software may also reside, completely or at least partially, within the main memory and/or within the processor during execution thereof by the computer system, the main memory and the processor also constituting machine-readable media.

The software may further be transmitted or received over a network via the network interface device.

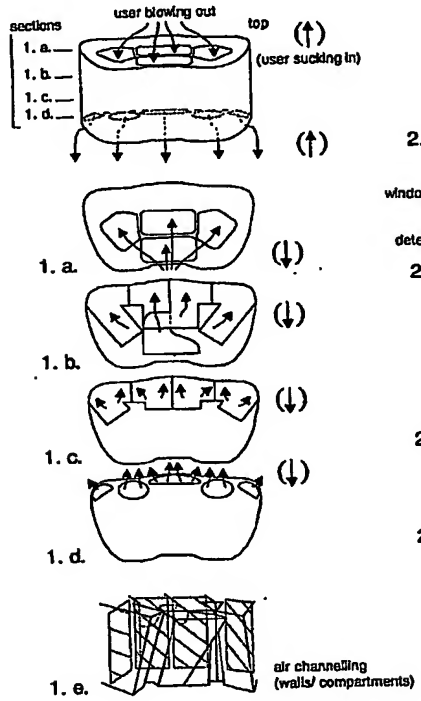
While the machine-readable medium is shown in an exemplary embodiment to be a single medium, the term "machine-readable medium" should be taken to include a single medium or multiple media (e.g., a centralized or distributed database, and/or associated caches and servers) that store the one or more sets of instructions. The term "machine-readable medium" shall also be taken to include any medium that is capable of storing, encoding or carrying a set of instructions for execution by the machine and that cause the machine to perform any one or more of the methodologies of the present invention. The term "machine-readable medium" shall accordingly be taken to included, but not be limited to, solid-state memories, optical and magnetic media, and carrier wave signals.

Thus, a method and apparatus to interact with a machine utilizing gestures have been described. Although the present invention has been described with reference to specific exemplary embodiments, it will be evident that various modifications and changes may be made to these embodiments without departing from the broader spirit

and scope of the invention. Accordingly, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense.


PROCESSOR
INSTRUCTIONS
MAIN MEMORY
INSTRUCTIONS
STATIC MEMORY
NETWORK INTERFACE DEVICE
NETWORK
BUS
VIDEO DISPLAY
ALPHA-NUMERIC INPUT DEVICE
CURSOR CONTROL DEVICE
DRIVE UNIT
MACHINE-READABLE MEDIUM
INSTRUCTIONS
SIGNAL GENERATION DEVICE

1. Air Flow



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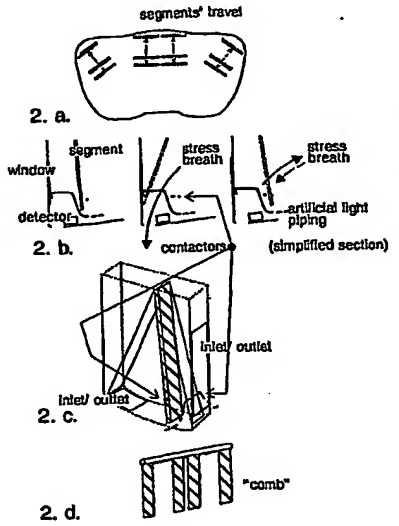
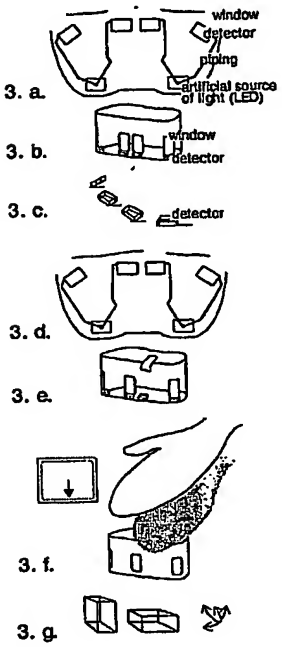
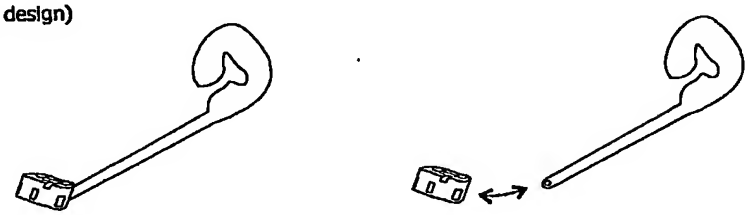


3. Light



4. Headset (possible design)



5. Gesture-based Interaction